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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/735,885 12/16/2003 Takeshi Nishi 07977-121003 4773

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EXAMINER

NGO, HUYEN LE

ART UNIT PAPER NUMBER

2871

MAIL DATE DELIVERY MODE

05/02/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/735,885

Applicant(s)

NISHI ET AL.

Examiner

Julie-Huyen L. Ngo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 02 February 2007.
- 2a) This action is **FINAL**.
- 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 11-24 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 11-24 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All
 - b) Some
 - * c) None of:
 - 1. Certified copies of the priority documents have been received.
 - 2. Certified copies of the priority documents have been received in Application No. _____.
 - 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) Notice of Informal Patent Application
- 6) Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on February 2, 2007 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohe et al. (US6011606A) in view of Yoshizo et al. (JP57-141478).

Ohe et al. discloses (Figs. 1-3) a liquid crystal electro-optical device comprising:

- a pair of substrates (7), at least one of said pair of substrates being transparent;
- a light modulating layer interposed between the pair of substrates, said light modulating layer including nematic liquid crystal
- comb-shaped electrodes for applying an electric field in a direction parallel with the pair of substrates (see figure 1)

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wherein a cell thickness d between the pair of substrates is about $4\mu\text{m}$ (col. 8, lines 50-55), which is within the range of $1\mu\text{m} < d < 10\mu\text{m}$ recited in claim 11.

In the case where the claimed ranges "*overlap or lie inside ranges disclosed by the prior art*" a prima facie case of obviousness exists. See also In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See MPEP § 2144.05.

However, Ohe et al. fail to disclose that their nematic light modulating layer including optical active substance and a dichroic dye.

Yoshizo et al. teach (abstract) mixing an optical active substance and a dichroic dye in a nematic liquid crystal of a light modulating layer for improving in visibility and contrast

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify a liquid crystal display device as Ohe et al. disclosed with a light modulating layer including nematic liquid crystal, optical active substance and a dichroic dye for improving in visibility and contrast, as taught by Yoshizo et al.

Claims 11-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sano et al. (US5694188) in view of Tomio et al. (JP57-117579), Wakita et al. (US5574593), Kobayashi et al (US5305126) and Ohe et al. (US6011606A).

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With respect to claims 11-13 and 15, Sano et al. discloses (at least in figs. 1, 7 and 10; col. 1, lines 30-41; col. 3, line 1 to col. 5, line 20) a liquid crystal electro-optical device comprising:

- a pair of substrates 1/17, at least one of said pair of substrates being transparent;
- a light modulating layer interposed between the pair of substrates, said light modulating layer including a guest-host type liquid crystal
- comb-shaped wall electrode 10 (11&12) for applying an electric field in a direction parallel with the pair of substrates (see figures 1, 7, 9 &10)

Wherein

- the liquid crystal molecules and the dichroic dye molecules are aligned in the direction parallel with the substrate/screen by the electric field to obtain a light transmission state (col. 4, line 57- col. 5, line 19).

However, Sano et al. do not clearly disclose that the guest-host type LC is used in their display device and included an optically active substance (claims 11 &12), and wherein the dichroic dye molecules are oriented in different directions around the axis that is perpendicular to the substrates to attain a dark state when the electric field is not applied (claims 14 and 16). Also Sano fails to disclose that a cell thickness d between the pair of substrates is in a range of $1\mu\text{m}<d<10\mu\text{m}$.

Tomio et al. teach (abstract) mixing an optical active substance in a guest-host liquid crystal (or cholesteric liquid crystal), which is composed of a nematic liquid crystal

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containing a dichroic dye as solute for improving display contrast by driving at low voltage.

Moreover, Wakita et al teach (abstract) mixing a trace of chiral dopant as an optically active substance to nematic liquid crystals and certain percent of dichroic dye to form guest host LC type for use in their LC display device to obtain brightness and high contrast.

It is well known in the art for a guest-host type LC to include an optical active substance such as chiral component in the LC material for compensating the performance of the dichroic dyes, which results in a good colored light scattering conditions under applied voltage condition as well as improve the threshold characteristics of the display as well as reducing the hysteresis response, which may become prominent when polarity of the applied voltage is changed, as evidenced by Kobayashi et al US 5305126 (col. 56, lines 40-50). Furthermore, a guest-host type is well known as a bright mode, which does not use a polarizer, (see Sano col. 1, lines 30-41) a guest-hole LC in which a chiral nematic liquid crystal acting as the optical active substance that provides cholesteric/nematic phase transition and dichroic dye, and intensively been developed due to its brightness and high contrast (see Wakita et al col. 1, lines 43-53).

Ohe et al. teach (abstract) forming a cell thickness d between the pair of substrates is about $4\mu\text{m}$, which is within the range of $1\mu\text{m} < d < 10\mu\text{m}$ for establishing the display pixel in a dark state at a low voltage and in a bright state at a high voltage.

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Therefore, it would have been obvious for one of ordinary skill in the art to realize that Sano et al's guest-host type LC including liquid crystals, an optically active substance (chiral), and a dichroic dye for obtaining brightness and high contrast, as taught by Wakita et al and/or as evidenced by Kobayashi et al. and Wakita et al. and for improving display contrast by driving at low voltage, as taught by Tomio et al.

Furthermore, Sano et al's guest-host type LC would obviously having a cell thickness d between the pair of substrates within the range of $1\mu\text{m} < d < 10\mu\text{m}$ for establishing the display pixel in a dark state at a low voltage and in a bright state at a high voltage, as taught by Ohe et al. since in the case where the claimed ranges "*overlap or lie inside ranges disclosed by the prior art*" a prima facie case of obviousness exists. See also In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See MPEP § 2144.05.

Claims 14 and 16:

Since the optical substance (chiral) is added to the nematic liquid crystal device of Sano et al. in view of Tomio et al., Wakita et al., or Kobayashi et al and Ohe et al. to form a cholesteric phase with helical arrangement of directors where the dichroic dye molecules lean on, the dichroic dye molecules are inherently oriented in different directions around the axis that is perpendicular to the substrates to attain a dark state when the electric field is not applied.

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Claims 17-18 and 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohe et al. (US6011606A) in view of Yoshizo et al. (JP57-141478) as applied above to claims 11-12 above, and in further view of Ohnishi et al. (US5730899).

Ohe et al. fail to disclose the liquid crystal has a spiral pitch p in a range of $1\mu\text{m} < p < 15\mu\text{m}$ as recited in claims 17-18; and has an orientation twist angle θ in a range of $\theta \leq 300^\circ$ as recited in claims 21-22.

Ohnishi et al. teaches (col. 6 lines 28-32, lines 50-54) the liquid crystal has a spiral pitch p in a range of $.2\mu\text{m} < p < 50\mu\text{m}$ and has an orientation twist angle θ in a range of $70^\circ - 300^\circ$ (abstract, col. 2 lines 55-56 and col. 2 lines 64-65) for reducing view angle dependency of contrast of display color over wide temperature range.

Note that the ranges of the spiral pitch and orientation twist angle in Ohnishi et al.'s liquid crystal overlap the ranges of $1\mu\text{m} < p < 15\mu\text{m}$ and $\theta \leq 300^\circ$ recited in claims 17, 18 and 21 & 22. Therefore, the ranges in said claims would have been obvious in view of the ranges disclosed by Ohnishi et al. (See In re Malagari, 499 F.2d 197, 182 USPQ 549 (CCPA 1974)).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the liquid crystal in Ohe et al. in view of Yoshizo et al. liquid crystal display device with a spiral pitch p in a range of $1\mu\text{m} < p < 15\mu\text{m}$; and with an orientation twist angle θ in a range of $\theta \leq 300^\circ$ for reducing view angle dependency of contrast of display color over wide temperature range, as taught by Ohnishi et al.

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Claims 17-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sano et al. (US5694188) in view of Tomio et al. (JP57-117579), Wakita et al. (US5574593) and Ohe et al. (US6011606A) as applied above to claims 11-13 and 15, and further in view of Ohnishi et al. (US5730899).

Sano et al. fail to disclose the features recited in claims 17-24.

Ohnishi et al. teaches (col. 6, lines 28-32 and lines 50-54) the liquid crystal has a spiral pitch p in a range of $1\mu\text{m} < p < 15\mu\text{m}$; and has an orientation twist angle θ in a range of $\theta \leq 300^\circ$ for reducing view angle dependency of contrast of display color over wide temperature range.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify Sano Sano et al. in view of Tomio et al., Wakita et al., or Kobayashi et al and Ohe et al. liquid crystal display device with the liquid crystal has a spiral pitch p in a range of $1\mu\text{m} < p < 15\mu\text{m}$ and has an orientation twist angle θ in a range of $\theta \leq 300^\circ$ for reducing view angle dependency of contrast of display color over wide temperature range, as taught by Ohnishi et al. (abstract, and col. 2, lines 55-56 and col. 2, lines 64-65).

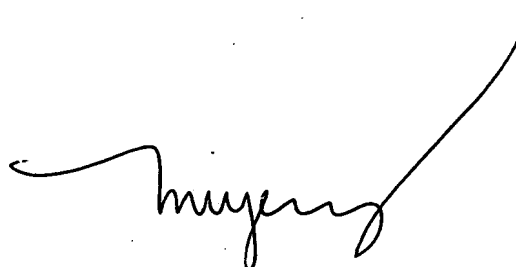
Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Julie-Huyen L. Ngo whose telephone number is (571) 272-2295. The examiner can normally be reached on M-Thursday.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (571) 272-1787. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



April 28, 2007

Julie-Huyen L. Ngo
Primary Examiner
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